

RESEARCH NOTE 84-9

MAINTENANCE PERFORMANCE SYSTEM (ORGANIZATIONAL)
OPERATOR AND ORGANIZATIONAL MAINTENANCE PRACTICE

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U. S. Army

Research Institute for the Behavioral and Social Sciences

January 1984

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Research Note 84-9	2. GOVT ACCESSION NO. AD A138437	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Maintenance Performance System (Organizational) Operator and Organizational Maintenance Practice		5. TYPE OF REPORT & PERIOD COVERED Contractor Report
		6. PERFORMING ORG. REPORT NUMBER TR465-1
7. AUTHOR(s) Richard G. Fuller, Steven M. Rugge, and Douglas H. Harris		8. CONTRACT OR GRANT NUMBER(s) MDA 903-81-C-0032
9. PERFORMING ORGANIZATION NAME AND ADDRESS Anacapa Sciences, Inc. Drawer Q Santa Barbara, CA 93102		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 2Q263743A794
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Research Institute for the Behavioral & Social Sciences 5001 Eisenhower Ave. Alexandria, VA 22333		12. REPORT DATE January 1984
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES 76
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES This project was monitored technically by Dr. Michael Drillings and Dr. Melissa Berkowitz		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Maintenance, Management Information System, Maintenance Training		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes how operator and organizational maintenance is practiced in a sample of battalions within a mechanized infantry division. It also describes maintenance doctrine, wherever doctrine and practice are found not to coincide. These descriptions provide a foundation for the development of a maintenance performance system designed to enhance the effectiveness of operator and organizational maintenance, the Maintenance Performance System-Organizational.		

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INTRODUCTION

This report describes how operator and organizational maintenance is practiced in a sample of battalions within a mechanized infantry division. It also describes maintenance doctrine, wherever doctrine and practice were found not to coincide. These descriptions provide an early foundation for the development of a maintenance performance system designed to enhance the effectiveness of operator and organizational maintenance.

Previous surveys, observations, and measures of Army maintenance have revealed a large number and wide variety of problems that affect maintenance performance. (A listing of recent publications that identify maintenance problems is provided in the References section of this report.) In an initial step of this project, the problems were analyzed and assigned to five broad categories—command emphasis, management information, management and leadership proficiency, application of resources, and technical proficiency. They suggest the primary avenues through which maintenance effectiveness can be enhanced.

To provide a firm basis for proceeding with this project, it was also necessary to define, in detail, the practices now employed in operator and organizational maintenance. Examination was made of preventive maintenance, fault discovery, task assignment, work flow, parts supply, fault correction, evacuation to support maintenance, publications, records, quality control, personnel resources, responsibilities, working relationships, and training. Variations in practice from doctrine were noted. Doctrine was defined by official publications that provided rules and guidelines for conducting maintenance at these levels.

METHOD AND SCOPE

Information was obtained, organized, and analyzed from three types of sources: data collected during a related project (Simpson and Fuller, 1980); applicable Army publications; and observations made and interviews conducted during field visits to four battalions (two armor and two infantry) at a FORSCOM installation.

Interviews were conducted with 20 individuals assigned to various maintenance positions within the four battalions. These responsibilities included: battalion maintenance officer, automotive maintenance technician, battalion maintenance sergeant, company motor officer, company motor sergeant, wheel mechanic, track mechanic, TAMMS clerk, platoon leader, platoon sergeant, tank commander, tank gunner, battalion motor officer, tank crewman, and M113 driver.

As preparation for conducting the interviews and as a basis for defining maintenance doctrine, the following publications were reviewed.

AR 11-14	Logistic Readiness
AR 710-2	Material Management for Using Units
AR 750-1	Army Materiel Maintenance Concepts and Policies
FM 29-2	Organizational Maintenance Operations
FM 43-1 (Test)	Organizational Maintenance Management
TM 38-750	The Army Maintenance Management System
TM 38-L22-15-2	Division Logistics System (DLOGS)
DAPAM 5-2	Improvement Guide for Soldier Leaders
DAPAM 750-1	Maintenance Guide for Leaders
ST 17-155	Armor Battalion Organizational Maintenance System Analysis, USAARMS
ST 17-161	Student Guide to Maintenance Management, USAARMS

NATURE OF THIS REPORT

This report summarizes current practice with respect to each aspect of operator and organizational maintenance. These practices, of course, are limited to those of the four battalions investigated and cannot be generalized beyond them at this time.

Detailed descriptions of each aspect of current maintenance practice are provided in Appendix A. Notable variations of practice from doctrine are indicated, as well as comments obtained from the individuals interviewed that provided insights into maintenance practice and performance. An annotated listing of local regulations and directives that relate to maintenance practice is presented in Appendix B. Copies of maintenance forms that are employed in practice during operator and organizational maintenance are provided in Appendix C.

MAINTENANCE PRACTICE

Operator and organizational maintenance, as practiced at the time of this report, are described in summary form here. Practice has been categorized into major maintenance activities, such as preventive maintenance checks and services, corrective maintenance and evacuation to support maintenance. Other considerations, such as availability of publications, personnel resources and responsibilities, and training are also described. Appendix A provides a detailed description of maintenance practices by topic, and identifies areas where practice diverges from doctrine. The reader should note that the variations cited do not constitute an evaluation of maintenance practice. No judgment is made or implied regarding the positive or negative impact of these variations.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Time periods for PMCS are listed on training schedules. However, the specific checks and services to be performed are seldom if ever included on the schedule. In armor units, operators, crews, and immediate supervisors are present for PMCS. In infantry units, available operators are present but other crew members and supervisors typically are not.

The emphasis during PMCS is on correcting faults and getting equipment off deadline. TM's at the -10 level and other checklists are available but are seldom used by operators. When faults are found the operators/crews attempt to make the needed repairs themselves. If they are unable to they go directly to a mechanic to get him to perform the repair. Only if this procedure fails is a DA Form 2404, Equipment Inspection and Maintenance Worksheet, completed and turned into the motor sergeant as a report of fault.

Some faults are discovered during PMCS. However most major faults are found only when the equipment malfunctions.

CORRECTIVE MAINTENANCE

The discovery of an equipment malfunction initiates a sequence of events involving the equipment operator and crew and various personnel with organizational maintenance responsibilities. Corrective maintenance practice is described in the following narrative and illustrated in the flow chart of Figure 1.

Upon discovery of a fault the operator/crew determine whether or not the repair is within their capability. If they consider it to be so they proceed with the repair. If not, notification of the fault is made directly to a mechanic. If the mechanic can identify and repair the fault, he does so with the assistance or in the presence of the operator/crew. No formal notification of completion is made if the repair can be effected in this manner. If a discovered fault cannot be identified and immediately repaired by operator/crew or mechanic, a DA Form 2404 is prepared by the operator/crew to give to the motor sergeant. Either the motor sergeant, a more proficient mechanic, or the automotive maintenance technician will identify the fault. If the repairs must be done by support maintenance, the motor sergeant will initiate procedures for evacuation of the equipment. However, if the repairs can be done at organizational level, the motor sergeant will assign the repair to a mechanic. It is likely that the organizational repair will be completed with the assistance of the operator/crew, again eliminating the need for any formal notification of return to service.

When parts are required, either by operator/crew or mechanic, they are requested from the PLL clerk.

If a mechanic has been assigned to the repair task by the motor sergeant, the mechanic notifies the motor sergeant of repair completion, and annotates a DA Form 2404 for the TAMMS clerk. Upon receipt of an annotated DA Form 2404, the TAMMS clerk posts the information to historical records in the DA Form 2408 series. The work done by the mechanic is seldom checked by the motor sergeant or other maintenance supervisor.

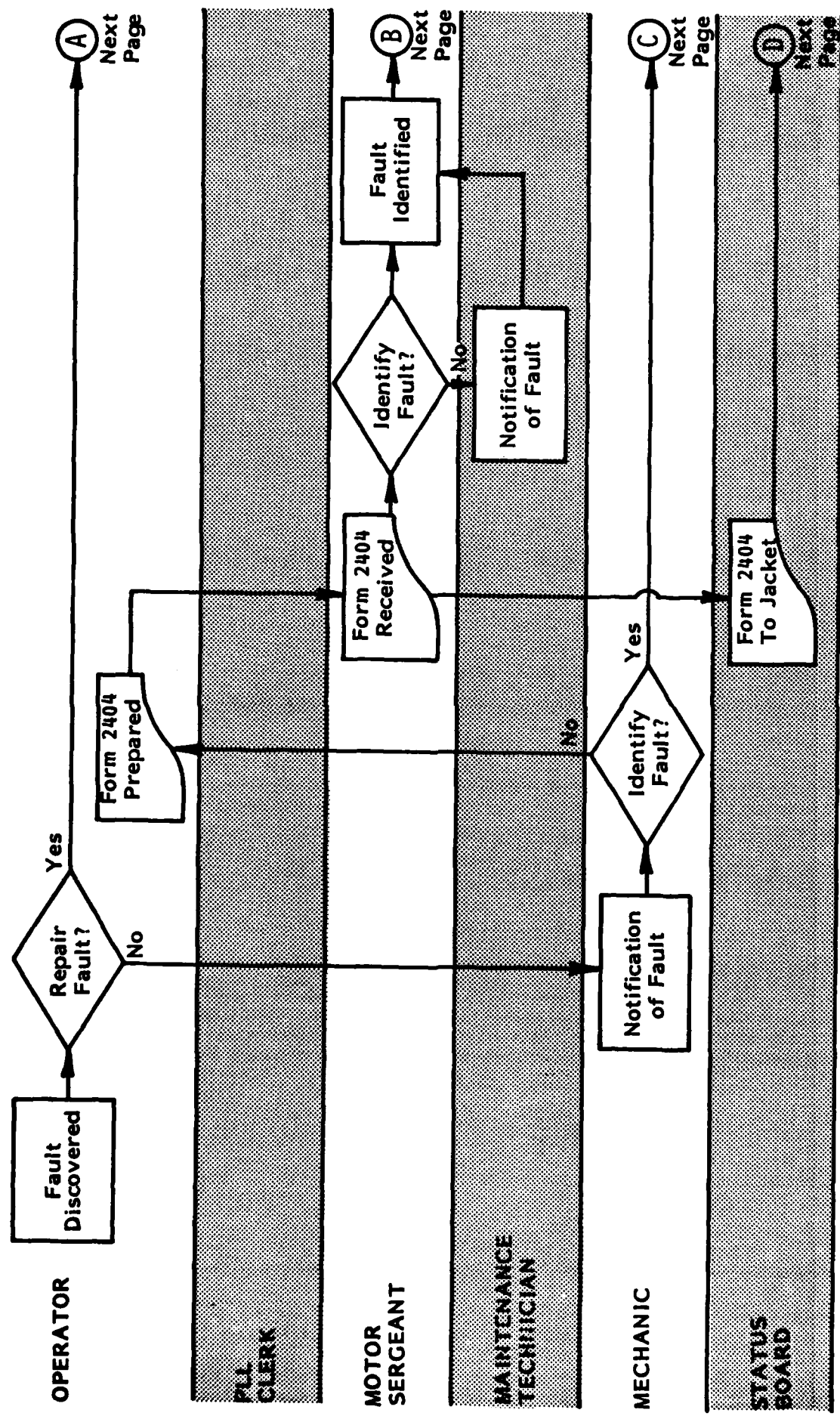


Figure 1. Sequence of procedures for organizational maintenance.

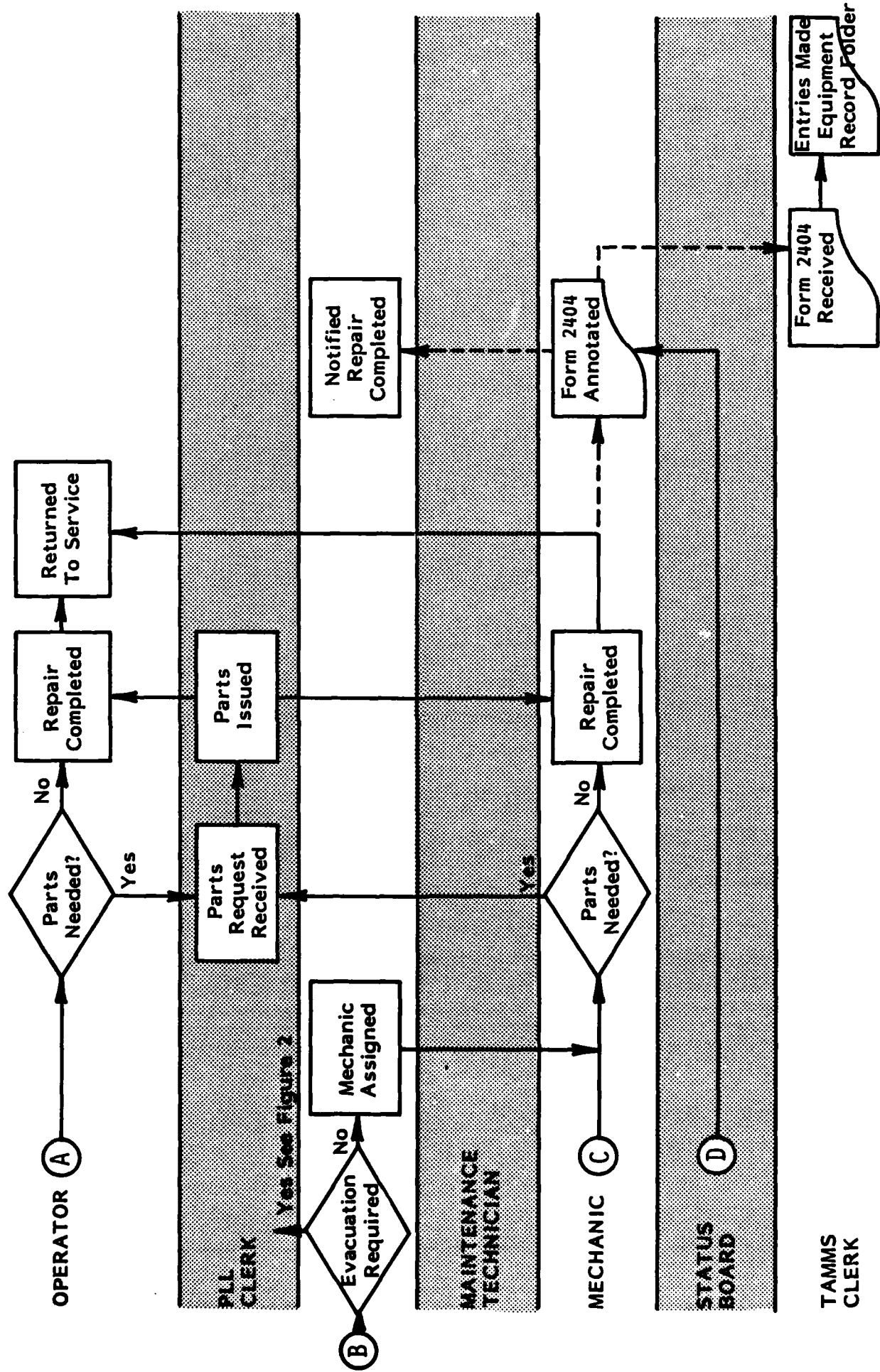


Figure 1 (Cont.) Sequence of procedures for organizational maintenance.

EVACUATION TO SUPPORT MAINTENANCE

Once a determination has been made that the equipment must be evacuated to support maintenance, the motor sergeant has the TAMMS clerk prepare a DA Form 2407 and two copies of the DA Form 2404, and remove the DA Form 2408-14 from the file. These forms are then sent as a package to the battalion maintenance office. The sequence of procedures for evacuation is described in the following narrative and illustrated in Figure 2.

The battalion-designated quality control inspector, typically a mechanic, inspects the equipment. Then, the company mechanic, assisted by the operator/crew, prepares the equipment for evacuation as directed by the quality control inspector. At this time, the battalion maintenance office assumes responsibility for the equipment. Either the automotive maintenance technician or the battalion motor officer, the only two persons authorized, sign the DA Form 2407 as requesting officer.

The equipment to be repaired and all supporting paper work, DA Forms 2407, 2404, and 2408-14, are taken to the support unit shop by personnel from the battalion maintenance office.

For tracked vehicles, just the item to be repaired, such as powerpack, sight, etc., goes to the support shop. For wheeled vehicles, the entire vehicle is taken to the support shop. Only in special circumstances, such as when the unit is in the field, will support personnel come to the customer equipment.

The support unit will accept the equipment only after all organizational maintenance faults have been corrected or are noted in the DA Form 2408-14.

Upon notification by the support shop that the equipment is repaired, personnel from the battalion maintenance office go to the support unit, inspect the equipment, and, if they accept it, return the equipment to the battalion motor pool. Then, company maintenance personnel and/or the operator/crew obtain the equipment from the battalion motor pool.

Maintenance practice for evacuation of equipment to support maintenance has been more burdensome than the procedures required by doctrine. Because

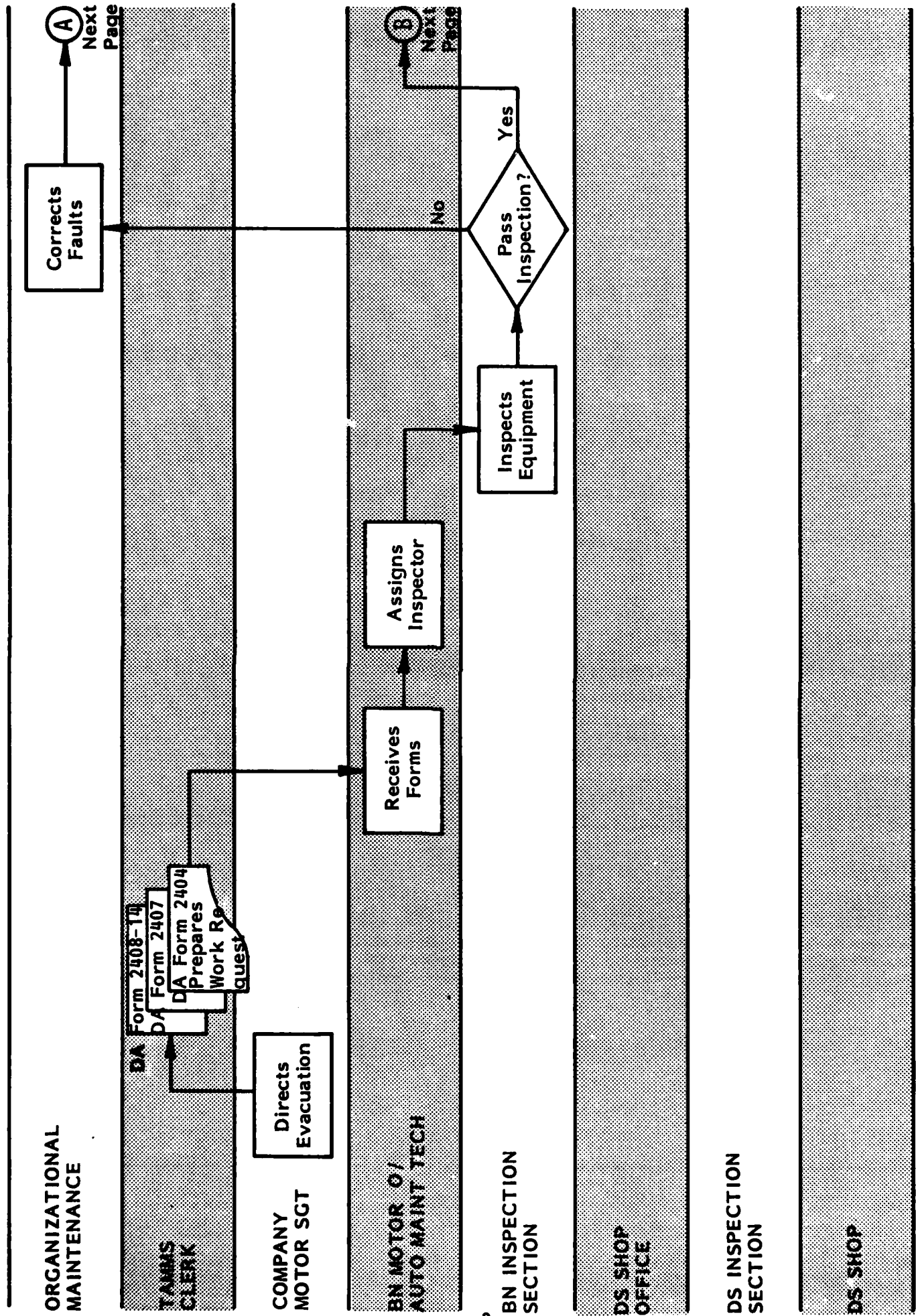


Figure 2. Sequence of procedures for evacuation to support maintenance.

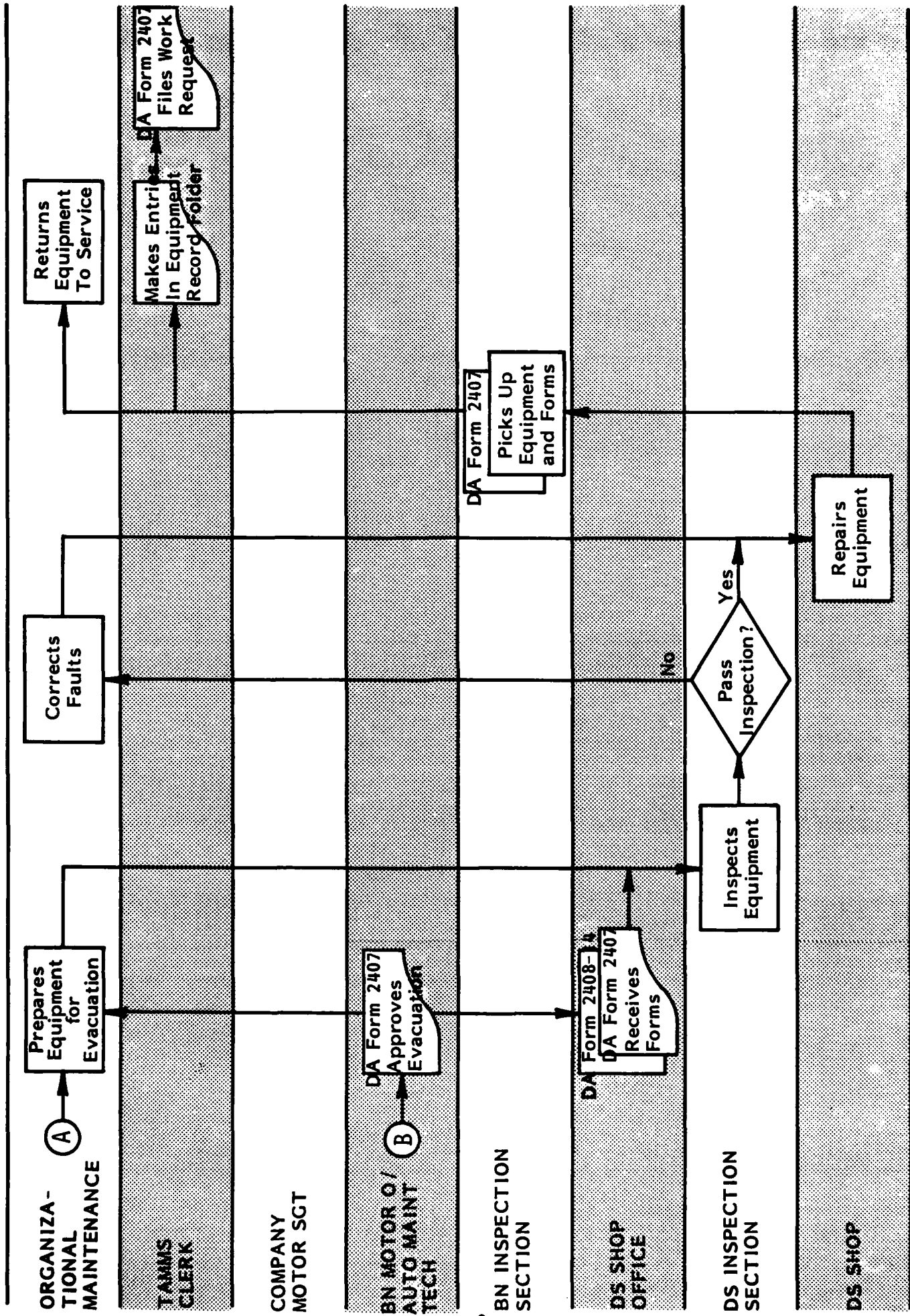


Figure 2 (Cont.) Sequence of procedures for evacuation to support maintenance.

of the burdensome procedures, combat units are reluctant to send their equipment to support maintenance. They either attempt to effect the repairs themselves or make an informal arrangement with support personnel to come to the unit to perform the repair.

REPAIR PARTS SUPPLY

When parts are needed for repairs, the person needing the parts, whether operator/crew or mechanic, goes directly to the company PLL clerk. Parts are requested either orally or by use of a local form. If parts are not immediately available, the PLL clerk takes action to obtain them through the supply system. Some vehicle commanders and platoon sergeants seek needed parts outside the supply system.

MAINTENANCE PUBLICATIONS

On the average, about 75 percent of the required -10 level Technical Manuals (TM's) are on hand for use by operators. Mechanics' access to -20 and -20P TM's is at a ratio of less than one TM per three items of equipment. Also, many of the -20 and -20P manuals are either not of the latest edition or lack the most recent changes.

Maintenance managers operate without many of the regulations and other publications applicable to organizational maintenance management. For example, the newly published FM 43-1 (Test), Organizational Maintenance Managers Guide, was not found in the units visited.

MAINTENANCE RECORDS

TAMMS records are not rigorously maintained. Recorded information is frequently based on informal oral reports or rough estimates.

Certain companies are now operating under a modified TOE in which they are not authorized both a TAMMS Clerk and a PLL Clerk, MOS 76D. However, these companies do have both clerks, substituting either an MOS 19E or MOS 11B for work in MOS 76D.

Maintenance managers are not familiar, in detail, with TAMMS procedures, having received no formal training in them. The battalion motor officers and most of the company executive officers had not been to a motor officer training course. Also, half of the company motor sergeants did not have a 63-series MOS as their primary MOS.

QUALITY CONTROL

At the company maintenance level, few quality control procedures are established. At the battalion maintenance level inspections are made of all equipment to be evacuated to support maintenance. In accordance with brigade standard operating procedures, each battalion operates an inspection point where all wheeled vehicles scheduled to be dispatched are inspected before leaving the motor pool. Also at the battalion maintenance level there is an editing point for checking all repair parts requisitions prior to their submission.

PERSONNEL RESOURCES

Maintenance sections have the numbers of personnel authorized by TOE or MTOE. However, assigned personnel have lower rank and skill levels than those authorized.

Maintenance sections have been supplemented by the assignment of additional personnel beyond ones authorized by TOE. At company level, the maintenance section has an additional clerk and an additional person to operate a tool room. At battalion level, the maintenance sections are augmented with persons who handle quality control, operate a dispatch inspection point and tool room, monitor the Army Oil Analysis Program, and edit PLL requisitions.

RESPONSIBILITIES

Responsibilities and duties of maintenance personnel vary widely depending upon individual skills and interests, desires of commanders and other supervisors, and local needs or conditions. The battalion executive officer is commonly responsible for logistics readiness and provides general supervision of maintenance

activities. The battalion motor officer functions as a staff officer concerned with operational readiness status and is not directly involved in the details of maintenance operations. The company motor officer is an extra duty of the company executive officer.

The automotive maintenance technician is a technical expert who also directs quality control, records, and repair parts sections. The battalion motor sergeant supervises maintenance and recovery operations as does the company motor sergeant.

BATTALION/COMPANY DIVISION OF WORK

Company maintenance sections are authorized to perform the same level of repairs as battalion maintenance sections and perform all of their own work whenever possible. Only on rare occasions do companies call on battalion maintenance for assistance. Battalion maintenance resources are applied primarily to performing periodic services on combat vehicles.

Support units never provide recovery or evacuation services to the combat units and seldom accomplish work on site.

Battalion maintenance handles repair parts supply in about half of the units that have a co-located PLL. In the remaining units each company handles its own repair parts requests channeling them through the battalion.

MAINTENANCE TRAINING

All vehicle operators go through a two-week driver training course on post which includes some instruction in PMCS. Some units also send selected mechanics to an on-post mechanic's course. However, aside from these courses, units rely exclusively on work experience for the development of skills and knowledge. No supervised on-the-job training or other type of technical training is provided in the unit.

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A P P E N D I X A

DETAILED DESCRIPTIONS OF MAINTENANCE PRACTICE, INCLUDING VARIATIONS FROM DOCTRINE

Detailed descriptions of each major aspect of current operator and organizational maintenance practice is provided in this appendix. For each aspect of maintenance, practice is described. Specific activities that vary from doctrine are underlined. For each variation, doctrine is summarized and referenced in a box at the right-hand side of the page.

Variations described here are not meant to be evaluative. No judgment is made or implied, at this time, regarding the impact (positive or negative) that variations might have on maintenance effectiveness.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Practice

Time for PMCS is included on the training schedule when units are in garrison. The time is allotted in four-hour blocks in armor units, but is as low as two-hour blocks in mechanized infantry units.

Certain maintenance objectives are published in division regulations (750-6) and battalion SOP's. However, neither these nor other specific maintenance objectives appear on the training schedule. Assignment of specific objectives is done by initiative of individual vehicle commander or platoon sergeants.

Drivers, other crew members, tank commanders, and platoon sergeants are present for PMCS in armor units. Only drivers are present in infantry units.

In armor units, tank commanders and other immediate supervisors are familiar with PMCS and troubleshooting techniques, while infantry unit first-time supervisors, in general, are not. Neither armor nor infantry supervisors have a comprehensive knowledge of TM 38-750 (TAMMS).

Variations from Doctrine

Adequate time must be allotted during duty hours for preventive maintenance (AR 11-14). A recommended time frame for tracked vehicles would be four-hour blocks (Par 4-2c, FM 29-2).

The training schedule should state precisely what services are to be performed (Par 4-2a, FM 29-2).

Maintenance is a command responsibility (Par 1-3b, AR 750-1).

Supervisors must be familiar with PMCS and troubleshooting, and have a comprehensive knowledge of TM 38-750 (Par 7-2a, FM 29-2).

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Practice

Before-operation checks are usually done during PMCS periods and before operating the vehicle in the field. During-operation checks are usually done only when a fault is found, i.e., the equipment breaks down. After-operation checks are typically not performed.

Operators/crews usually use -10 level TM in performing PMCS. The -10 lists are supplemented in some units by special checklists overprinted on DA Form 2404's. These checklists are derived from unit inspection standards published in division circulars (20-49 and 20-52) and are primarily used by maintenance personnel, not by operators/crews.

Faults are usually reported orally to a mechanic. Operators/crews complete a DA Form 2404 only when they can't get a mechanic to immediately come fix the fault.

Typically no maintenance training for operators or crews is done by the units, nor is any shown on the training schedules.

Variations from Doctrine

Operator/crew must complete PMCS before-, during-, and after-operation checks (-10 level TM for equipment, Par 2-9, FM 29-2).

Operator/crew record uncorrected faults on DA Form 2404 (Par 3-4, TM 38-750; Par 7-5, FM 29-2).

Maintenance training for operators and crews is combat training, and should be shown on the training schedule (Par 4-2a, FM 29-2).

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Practice

Variations from Doctrine

Notes and Interview Comments

One unit initiated a program for training operators to do PMCS. Two vehicles a day are brought to the battalion maintenance shop where battalion mechanics show the operators how to perform PMCS. It takes six weeks to do the entire vehicle fleet so each vehicle comes into the battalion maintenance shop once every six weeks.

Operators and crews generally felt that they performed all PMCS within their capabilities and also did jobs that should be done by mechanics. On the other hand, mechanics and maintenance supervisors felt that maintenance personnel were usually called too quickly, and that operators/crews should exert more effort before calling them.

During PMCS periods, the emphasis is not on preventive maintenance, but rather is on getting equipment off deadline, i.e., fixing faults that have already occurred rather than preventing new ones. Several respondents noted that only minor faults were found during PMCS. The major faults were found when the equipment broke down.

CORRECTIVE MAINTENANCE

Practice

Unscheduled corrective maintenance requirements constitute the majority of work done at the organizational level.

The emphasis in corrective maintenance is on keeping equipment operationally ready. Attempts are made to repair faults as soon as they are found and keep equipment off deadline (not operationally ready) or, if the equipment is deadlined, to return it to operational status as soon as possible.

About half of maintenance faults are discovered when the equipment breaks down. The other half are found during PMCS, periodic services and inspections, or as a result of the Army Oil Analysis Program (AOAP). Inspection includes dispatch inspection, command inspection, and technical inspections done prior to entry into support maintenance.

When a fault is discovered, the operator/crew fix the fault themselves whenever possible. If parts are needed for a repair, they are obtained directly from the PLL clerk. Operator/crew-performed repairs are not recorded on a DA Form 2404.

Variations from Doctrine

The majority of work consists of scheduled services (Par 5-21a, FM 29-2).

The operator/crew must report faults as soon as they are suspected or detected (Par 7-5, FM 29-2). Faults are commonly identified during PMCS (Par 7-5, FM 43-1) (Test).

Operator/crew-performed repairs requiring parts are to be recorded on DA Form 2404 (Par 3-4, TM 38-750).

CORRECTIVE MAINTENANCE

Practice

If operator/crew cannot repair a fault, they orally request a mechanic to make the repair without writing the fault up on a DA Form 2404. If a mechanic is not available, they will either attempt to do the repair themselves or report the fault to the company motor sergeant on a DA Form 2404.

If a mechanic is available and he can identify and repair a fault, he does so. Often he relies on his knowledge and/or the advice of more experienced mechanics to guide him, rather than use a technical manual. Any necessary parts are obtained from PLL clerk.

Work assignment for mechanics on corrective maintenance is most commonly initiated by the operator. He finds a mechanic that is available and gets him to come make the repairs. Essentially the mechanic assigns himself to a job. The motor sergeant assigns a repair job to a mechanic when the operator can't find a mechanic available and reports the fault to the company motor sergeant on a DA Form 2404.

Variations from Doctrine

If the operator is not authorized or able to accomplish the repair, he must report the defect on DA Form 2404 to unit maintenance personnel (Par 7-5, FM 29-2; Par 3-4, TM 38-750).

Only repairs authorized at the operator/crew level are to be performed by operator/crew (Par 1-10 and Appendix II, TM 9-2350-215-20; Par 7-13, FM 43-1; Par 7-13, FM 43-1 (Test)).

Maintenance supervisor assigns mechanic to verify and repair reported fault (Par 5-21, FM 29-2; Par 7-6, 7-12, FM 43-1 (Test)).

CORRECTIVE MAINTENANCE

Practice

The motor sergeant maintains a status board for tracking the faults reported to him. The usual system is a board with vehicle numbers on it and a slot or jacket below each number. When a DA Form 2404 is received, the motor sergeant puts it in the slot for that vehicle until repairs are completed. This provides a visual indication of equipment needing repair and is a basis for assigning priority work to mechanics. Another work control system is a chart covered with acetate and notations of repair status made in grease pencil.

The company motor sergeant is often not aware that repairs are taking place, did not assign the job, and cannot make appropriate quality control checks.

Sometimes the mechanic will orally inform the motor sergeant of repairs he did as a result of an operator/crew informal request.

The mechanic might also orally inform the TAMMS clerk of repairs he did which required parts or deadlined a vehicle, because the TAMMS clerk needs that information in the preparation of other forms.

Variations from Doctrine

Company motor sergeant should assign all tasks that a mechanic does, and should check the mechanic's work to assure quality control (Par 10-5, FM 29-2; Par 7-12, FM 43-1 (Test)).

Mechanic initials appropriate repair on DA Form 2404 when completed (Par 3-4, TM 38-750; Par 7-12, FM 43-1 (Test)).

Since all repairs done by a mechanic or requiring parts should be written up on a DA Form 2404, the TAMMS clerk should get required information from that form (Par 3-4, TM 38-750).

CORRECTIVE MAINTENANCE

Practice

If a mechanic cannot identify or repair a fault, the operator/crew prepares a DA Form 2404 and gives that form to the company motor sergeant as a report of fault.

The motor sergeant then checks the fault. If he can identify the fault, he assigns a mechanic to repair the fault, showing him how if necessary. If the company motor sergeant has no mechanic available, he might do the repair himself. Some motor sergeants spend at least half their time doing repairs.

If the company motor sergeant cannot determine the cause of a fault, he consults the battalion maintenance sergeant or the automotive maintenance technician.

If company maintenance personnel cannot perform the repair, then battalion mechanics might perform it. Battalion maintenance requires the company to submit DA Form 2407 only on welding jobs. However, the battalion welder often does jobs for companies on an informal request basis without filling out DA Form 2407.

Company and battalion maintenance sections perform the same level of repairs. Both sometimes do repairs authorized only at direct support level. Parts needed to accomplish DS-level repairs are obtained outside regular supply channels. The level at which repairs are accomplished seems to depend

Variations from Doctrine

The company motor sergeant should supervise repairs or use them for OJT, not do them himself (Par 2-9, FM 29-2; Par 7-13, FM 43-1 (Test)).

Use the DA Form 2407 for all requests for support maintenance (Par 3-6, TM 38-750).

Repairs should be accomplished at lowest authorized level, but should not be accomplished at levels lower than authorized in the Maintenance Allocation Chart (Appendix II and Par 1-10, TM 9-2350-215-20; Par 7-13, FM 43-1 (Test)).

CORRECTIVE MAINTENANCE

Practice

more on the urgency of a repair job, the skill level of mechanics, and the workload in the respective maintenance shops than on the doctrinally authorized task levels.

When the mechanic has completed a repair task assigned by the motor sergeant, the mechanic notifies the motor sergeant of job completion. If a DA Form 2404 has been filled out, the mechanic initials the repairs he has completed on that form.

A quality control check is performed on fewer than half the repairs assigned by the motor sergeant.

Whether or not a mechanic's work is checked depends on the mechanic and how busy the company motor sergeant is. Many mechanic's repair jobs are never checked. At other times the platoon sergeant or tank commander, if they are knowledgeable, might check the mechanic's work on their own vehicles.

To summarize, the corrective maintenance work flow is from operator/crew to mechanics and back to operator/crew. If neither can accomplish the needed repairs, then the motor sergeant is notified and he directs further actions to complete the repairs. The vehicle commander and the platoon leader/sergeant enter the work request flow only if there is a particular or unusual problem.

Variations from Doctrine

Quality control procedures must be established in each functional area in the maintenance operation in order to ensure that all required steps of a job have been correctly completed (Par 4-2, FM 29-2).

Maintenance work flow is from operator/crew to vehicle commander, to platoon leader/sergeant, to motor sergeant, to mechanic and records. Flow is reversed after repair (Page C-30, FM 29-2).

CORRECTIVE MAINTENANCE

Practice

Variations from Doctrine

Notes and Interview Comments

Many mechanics said that over half the repairs they did were the result of informal oral requests from operator/crew rather than assignments from the company motor sergeant.

Both TAMMS clerks interviewed said that 80% of the information on parts replacement and dead-lined vehicles is orally reported. The other 20% comes from DA Form 2404's.

Mechanics said that most jobs were done right the first time. However, supervisors said that only 50% of repair jobs were done correctly the first time.

EVACUATION TO SUPPORT MAINTENANCE

Practice

Variations from Doctrine

COMPANY-LEVEL PROCEDURES

Initial determination of a need to evacuate equipment to the support unit is made by the operator/crew, platoon sergeant, mechanic, or company motor sergeant. However, any request for evacuation is cleared through the company motor sergeant who decides whether to transmit the request to battalion maintenance or handle the repair problem at the organizational level. If he decides to transmit the request to battalion maintenance, he requests the TAMMS clerk prepare a DA Form 2407 and two copies of DA Form 2404. These forms along with a copy of DA Form 2408-14 are then sent to the battalion maintenance office. The company motor officer or company commander is not normally involved in any review of DA Form 2407.

Only DA Form 2407 is required (Par 5-22b, FM 29-2). Mechanic/maintenance supervisor prepares DA Form 2407 (Par 7-15, FM 43-1 (Test)).

BATTALION-LEVEL PROCEDURES

The battalion quality control inspector, usually a mechanic, will inspect the equipment requested to be evacuated and decide whether to transmit the request to the support unit or handle the repair at organizational level. If he decides to transmit the request to the support unit, he then directs a company mechanic, assisted by operator/crew, to prepare the equipment for evacuation. When the quality control inspector is satisfied that the equipment is ready for evacuation, he so reports to

Battalion level inspection is not required (Par 5-22b, FM 29-2).

EVACUATION TO SUPPORT MAINTENANCE

Practice

the automotive maintenance technician or battalion motor officer, who are the only persons authorized to sign DA Form 2407 as requesting officer. As required by the support unit SOP, the equipment and all supporting paperwork, DA Forms 2407, 2404, and 2408-14 are taken to the support unit shop by personnel from battalion maintenance.

Variations from Doctrine

Repairs are accomplished on site whenever possible (Par 1-3b and 3-3f, AR 750-1). Operator/crew should deliver equipment to support unit shop and stay with equipment until it is accepted by the support unit (Par 5-22b, FM 29-2).

SUPPORT UNIT PROCEDURES

In a garrison situation, SOP is that virtually all evacuated equipment must be repaired in the support unit shop. Only in special circumstances, i.e., when the unit is in the field, will support personnel come to the customer unit. When the equipment arrives at the shop, inspectors from the support unit perform a complete technical inspection prior to accepting equipment for repair. If uncorrected organizational level faults are found during inspection, organizational maintenance has 72 hours to correct them or the job will be refused. The support unit will accept equipment only after all organizational maintenance faults have been corrected or are noted on DA Form 2408-14.

The support unit maintenance control supervisor will determine for each job if the repair is to be accomplished on site or in the support unit shop (Par 5-22b, FM 29-2).

The support unit has the option of accepting equipment with organizational maintenance deficiencies and providing the customer unit with a list of organizational deficiencies and materiel defects when repair is completed and equipment is returned to customer control (Par 5-22b, FM 29-2).

EVACUATION TO SUPPORT MAINTENANCE

Practice

Variations from Doctrine

RETURN TO SERVICE

After the support unit completes repairs, the support unit shop notifies battalion maintenance. Personnel from battalion maintenance go to the support unit, inspect and accept the equipment, and return it to the battalion motor pool. The battalion then notifies company personnel who pick up the equipment from battalion maintenance.

Notes and Interview Comments

Company maintenance personnel say that often battalion maintenance personnel will accept a support unit repair without inspecting it. This leads to many pieces of equipment being returned which still have problems. Company maintenance is then forced to take care of these problems.

REPAIR PARTS SUPPLY ACTION

Practice

When parts are needed for repairs, the person needing the parts, whether operator/crew or mechanic, goes directly to the company PLL clerk. Parts are requested either orally or by use of a local form, called a "want slip."

If the needed part is in stock, it is issued immediately to the person requesting it. The PLL clerk then annotates his inventory document, a computer printout, and takes action to request a replacement part. Parts are available 80-90% of the time. If parts are not available, the PLL clerk fills out a requisition and submits it. The person requesting the parts then attempts to procure the parts elsewhere outside the supply system. Some vehicle commanders and platoon sergeants appear to prefer this method to reliance on the supply system.

Requisitions by the PLL clerk are not checked for accuracy at the company level, but are edited at battalion. The division supply point maintains records on requisition error rate.

PLL inventories are usually spot checks. Full inventories are seldom done. The goal for inventory accuracy is 97%.

Variations from Doctrine

A physical inventory of PLL stocks will be conducted every six months (Par 2-38d, AR 710-2).

The inventory accuracy should be 100% (Par 4-2e, FM 29-2).

REPAIR PARTS SUPPLY ACTION

Practice

Variations from Doctrine

Notes and Interview Comments

One infantry battalion visited had co-located PLL at battalion level, and the other infantry battalion was in the process of changing to co-located PLL. Neither of the two tank battalions had co-located PLL.

In the battalion changing to co-located PLL, plans are to restrict parts requests to mechanics and require use of DA Form 2407-1, but this had not yet been implemented.

Requisition error rate varied from four percent in the battalion with co-located PLL to 15 percent in other battalions. High error rates are attributed primarily to requisitions from headquarters and combat support companies, not line companies. High error rates were also given as a reason by battalion maintenance for co-locating PLL at battalion.

Line companies have a lower requisition error rate than headquarters or combat support units because the types of equipment in line companies are limited and the same items are continually requested. Headquarters and combat support units have a greater diversity of equipment and requisitions are less repetitive.

REPAIR PARTS SUPPLY ACTION

Practice

Variations from Doctrine

Some respondents indicated that it took much longer to get requisitioned parts at this post than at other places where they had been stationed and, as a consequence, the maintenance effort locally is in worse shape than at other installations.

MAINTENANCE PUBLICATIONS

Practice

Approximately 75 percent of equipment operators have a -10 level TM for their equipment. Many of the -10's, however, are not the most current ones or are not the correct versions for the model of equipment on hand. The -10 level TM are supplemented by local checklists derived from Fort Carson circulars.

The TM's and checklists that are available are not routinely used by operators/crews. Often operators believe that they have done the checks in the manual enough times that they know the routine, so they don't need to use the manual anymore.

Similarly, mechanics rely on their experience or consult someone else in lieu of using a -20 TM. When requesting parts, the mechanic tells the PLL clerk the type of parts needed, and lets the PLL clerk worry about the stock number and other parts data.

Variations from Doctrine

Publications must be available and should be current (Par 4-2g, FM 29-2).

Operators/crew perform PMCS checks using -10 level TM (Par 2-9j, FM 29-2; Par 7-3, FM 43-1 (Test)).

Mechanics consult -20 level TM's when diagnosing faults (Par 2-9e, FM 29-2; Par 7-7, FM 43-1 (Test)).

Notes and Interview Comments

Availability of current maintenance publications appears to be a problem, particularly at the company level. The publications that are on hand are not sufficiently used.

Publications are also needed by maintenance managers. Battalion maintenance usually has a full set, but company shops do not. Several management publications that were available in the company were out of date. TM 38-750 lacked change 3, for example.

MAINTENANCE RECORDS

Practice

Most of the information recorded (about 80 percent) in TAMMS is based on oral reports or on estimates.

DA Form 2404 is not always filled out by operator/crew when they have detected a fault they cannot fix. Usually DA Form 2404 is filled out only when operator/crew cannot get a mechanic to come fix the problem. (See the section on Corrective Maintenance.)

DA Form 2404 is not used to request repair parts. Instead, a local form called a "want slip" is used which goes directly from operator/crew to the PLL clerk. (See the section on Repair Parts Supply.)

DA Form 2406 is filled out daily by the TAMMS clerk. The company motor officer uses this form as a basis for his daily reports to the company commander on the operational readiness state of company vehicles.

DD Form 314 is used to schedule services for company vehicles. When one service is performed, the TAMMS clerk notes it on DD Form 314 and schedules the next service. Organizational NORS/NORM time is also recorded on DD Form 314.

Variations from Doctrine

Complete and accurate records must be kept (Par 1-7b, TM 38-750). All maintenance information needed for TAMMS records should be filled in on DA Form 2404 (Par 3-4, TM 38-750).

If the operator is not authorized or able to accomplish the repair, he must report the defect on DA Form 2404 to unit maintenance personnel (Par 7-5, FM 29-2; Par 3-4, TM 38-750).

MAINTENANCE RECORDS

Practice

DA Form 2407 is used by organizational maintenance when requesting evacuation of a repair job to direct support. It is also used by company maintenance to request welding jobs from battalion maintenance. However, not all welding jobs done are requested on DA Form 2407 as the battalion welder will often do jobs on an informal request basis. (See Corrective Maintenance.)

For the most part, the TAMMS clerk is more knowledgeable about TAMMS procedures than are maintenance supervisors. Typically supervisors have had no training in TAMMS procedures.

Several forms that should be filled out by operator/crew are not because crew members cannot fill them out properly. These forms include DA Forms 2408-1 and 2408-4. The operator or tank commander fills out scratch copies of these forms and gives them to the TAMMS clerk, who transfers the information to permanent copies of those forms.

Installation Form 48 is a local form used by the TAMMS clerk to record Oil Analysis for AOAP. The information on the local form is used to fill out the tag (DA Form 2026) which is attached to the sample before it goes to the AOAP lab. The local form is saved and used as a basis for the monthly AOAP report to battalion.

Variations from Doctrine

Supervisors need a comprehensive knowledge of TAMMS records and forms flow (Par 2-9, 7-2, FM 29-2; Par 6-24, 25, FM 43-1 (Test)).

DA Form 2408-1, cols b-g will be filled out by operator/crew (Par 4-5, TM 38-750). DA Form 2408-4 will be filled out by user (Par 4-6, TM 38-750).

MAINTENANCE RECORDS

Practice

Some company maintenance sections are now operating under a modified TOE in which they are authorized one PLL/TAMMS clerk. However, most companies find that handling both PLL and TAMMS is too much for one person so a tank crewman (MOS 19E) or an infantryman (MOS 11B) is usually put to work full time as a TAMMS clerk. Battalion maintenance is authorized a TAMMS clerk but not a PLL clerk, so they usually have a mechanic working full time as a PLL clerk.

Variations from Doctrine

Personnel resources allocated by the TOE or MTOE are sufficient to accomplish required tasks (Par 2-3, FM 29-2).

Notes and Interview Comments

DA Form 2407-1 is planned for use by mechanics in requesting repair parts at one battalion. However, this practice had not been instituted.

One of five battalion or company motor officers interviewed had taken a motor officer training course. One motor sergeant interviewed had taken an on-post TAMMS course but felt that he knew only the basics and could not really inspect TAMMS records for errors.

QUALITY CONTROL

Practice

Variations from Doctrine

At the company level, few specific quality control actions are taken. There is no designated quality control section or inspector. Substantially less than half the repairs performed by company mechanics are inspected by the company motor sergeant. Most, if checked, are checked by the tank commander of the vehicle being repaired or his platoon sergeant.

Quality control procedures must be established in each functional area in the maintenance operation (Par 4-2, FM 29-2). Company should have a quality control section (Par 10-6, FM 29-2).

Company motor sergeants, will spot check the supply requisition forms, DA Forms 2765 and 2765-1 from time to time. For the most part, however, the PLL clerk is responsible for the accuracy of these forms.

All repairs performed by company mechanics should be checked by the company motor sergeant (Par 5-21, FM 29-2; Par 7-12, FM 43-1 (Test)).

The TAMMS records are also spot checked occasionally, but the TAMMS clerks themselves are mostly responsible for keeping the records straight. Normally the TAMMS clerks know more about the intricacies of TAMMS record keeping than do maintenance supervisors.

PLL clerk works under the supervision of the motor sergeant (Par 2-9g, FM 29-2).

In battalion maintenance, quality control is more extensive. Battalion mechanics perform a variety of quality control inspections. Usually one or two mechanics have primary responsibility for performing these inspections and report directly to the automotive maintenance technician.

QUALITY CONTROL

Practice

Battalion inspectors check all equipment to be evacuated to support maintenance for uncorrected organizational level deficiencies. Any such deficiencies found are either corrected by the company or written up on DA Form 2408-14.

In accordance with brigade SOP, each battalion operates an inspection point where all wheeled vehicles scheduled to be dispatched are inspected before leaving the motor pool.

Corrective maintenance performed by battalion mechanics is usually checked by either a senior mechanic or the battalion maintenance sergeant.

The battalion also operates an editing point for checking all repair parts requisitions prior to their submission. (See the section on Repair Parts Supply Action.)

Scheduled services are used at both battalion and company level as a quality control measure. Mechanics perform a technical inspection on a vehicle during periodic servicing so that faults not detected during PMCS can be corrected.

Variations from Doctrine

PERSONNEL RESOURCES

Practice

Maintenance sections generally have the numbers of personnel authorized by TOE or MTOE. However, assigned personnel have lower rank and skill levels than those authorized. For example, the battalion motor officer is likely to be a lieutenant; the company motor sergeant is likely to be an E-6.

Frequently assigned personnel have a different MOS than authorized. Half the company motor sergeants interviewed, for example, did not have a 63 series MOS as their primary MOS.

Most maintenance sections have found it necessary to include additional personnel beyond ones authorized by TOE or MTOE. Certain companies are now operating under a modified TOE in which they are authorized only one clerk MOS 76D who is to manage both PLL and TAMMS. These companies, however, find that one person cannot handle both jobs so they substitute an MOS 19E or Mos 11B for work in MOS 76D. No tool room clerk is authorized under TOE, yet most maintenance sections find it necessary to assign a mechanic to work in the tool room, controlling access of organizational personnel to tools.

Variations from Doctrine

TOE authorized rank for BMO is captain (TOE 17-36h).

TOE authorized rank for company motor sergeant is E-7 (TOE 17-37h).

TOE authorized MOS for company motor sergeant is 63C (TOE 17-37h).

Personnel resources allocated by TOE or MTOE are sufficient to accomplish required tasks (Par 2-3, FM 29-2).

Tool room control is one of necessary functions in maintenance management (Par 2-11, FM 29-2). No tool room control personnel authorized in TOE (TOE 17-37h).

PERSONNEL RESOURCES

Practice

At battalion level, the maintenance sections are augmented with persons who handle quality control, operate a dispatch inspection point and tool room, monitor the Army Oil Analysis Program, and edit PLL requisitions.

Notes and Interview Comments

One company motor sergeant is a wheel mechanic (E-6) with no prior experience on track vehicles. He is attempting to learn about track vehicles on the job and through a correspondence course.

There is more personnel turbulence in battalion maintenance than in company maintenance sections. Battalion supervisors said that most of their mechanics left within a year after arrival. One company mechanic, on the other hand, said that once a first-timer is assigned to a company maintenance section, he stays for his entire first term. Company maintenance supervisors also did not stress the turbulence problem, while battalion maintenance personnel did.

There may also be a difference in skill level between battalion mechanics and company mechanics. One company motor officer stated that battalion maintenance gets the least proficient personnel. Also, company maintenance supervisors did not comment as much as battalion maintenance supervisors did about the quality of their mechanic's work.

Variations from Doctrine

Quality control is one of the necessary functions in maintenance management (Par 4-2, FM 29-2). No quality control, dispatch, tool room, AOAP, or PLL personnel in TOE for battalion maintenance sections (TOE 17-36h).

PERSONNEL RESPONSIBILITIES

Practice

The battalion executive officer commonly has responsibility for logistics readiness. He exercises general supervision of maintenance and other logistical activities of the battalion. The battalion motor officer is a staff officer primarily concerned with maintenance and operational readiness of the equipment. He monitors the readiness status of all units in the battalion and prepares reports for the battalion commander, executive officer, and the rest of the staff. The battalion motor officer also handles external contacts and liaison with other maintenance activities, i.e., other battalions, support units, DISCOM, and division staff.

The automotive maintenance technician is the technical expert for solving complex repair problems. He also supervises quality control, TAMMS, repair parts requests, and scheduling of periodic services.

The battalion maintenance sergeant directs the activities of the battalion maintenance section, which includes the turret and automotive repair sections, tool room, welder and recovery section. He supervises the accomplishment of repairs and periodic services.

The company motor officer is an additional duty of the company executive officer. Like the battalion motor officer, his primary concern is operational readiness of the equipment. He provides general supervision of the company maintenance section, ensures that it is attentive to repair of

Variations from Doctrine

The battalion motor officer directs the battalion maintenance section (Par 2-8a, FM 29-2). Note: conflicts with Par 2-9a, which agrees with practice.

PERSONNEL RESPONSIBILITIES

Practice

deadlined equipment and takes other necessary actions to expedite repairs. The motor officer also handles external contact and liaison with other maintenance activities.

The company motor sergeant directs the company maintenance section. He schedules and assigns work for mechanics and provides general, but not technical, supervision for the TAMMS and PLL clerks. The motor sergeant also frequently acts as a mechanic, doing repair jobs himself. Supervision of equipment operators is left to the vehicle commanders and platoon sergeants.

Variations from Doctrine

The major part of his duties is to ensure that operators/crews perform preventive maintenance (Par 2-8b, FM 29-2). The motor sergeant supervises and assists the company's organizational maintenance personnel and equipment operators (Par 2-9c, FM 29-2).

BATTALION/COMPANY DIVISION OF WORK

Practice

Company maintenance sections perform the same level of repairs as battalion maintenance sections and perform all of their own work whenever possible. On rare occasions, companies call on battalion maintenance for assistance, except for welding jobs. Only battalion maintenance has a welder, and he does welding jobs for the companies.

Battalion requires that a DA Form 2407 be filled out only for welding jobs. Even this is not always done, as the welder will do jobs for companies on an informal request basis without filling out DA Form 2407. (See section on Corrective Maintenance.)

At battalion level, the majority of work consists of scheduled periodic services, either "Q" or "S," on combat vehicles. However, at company level the majority of work consists of unscheduled corrective maintenance.

Battalion maintenance takes care of half of the scheduled services for the line company combat vehicles. Division would like battalion maintenance to do all services. The presence of the Automotive Maintenance Technician at battalion level offers better technical supervision. Further, battalion maintenance personnel are more insulated from pressure to get the services done rapidly and are thought to be less likely to use an "M-1 pencil," i.e., check off services as having been performed when they were not actually done. However, battalion

Variations from Doctrine

The Maintenance Allocation Chart differentiates between repair tasks authorized at company level and those authorized at battalion level (Appendix II, TM 9-2350-215-20).

Use the DA Form 2407 for all requests for support maintenance (Par 3-6, TM 38-750).

The majority of work consists of scheduled services (Par 5-21a, FM 29-2).

BATTALION/COMPANY DIVISION OF WORK

Practice

can't handle all combat vehicle services. Wheeled vehicle services and the track services that battalion can't do are handled by company maintenance.

Battalion also provides or coordinates recovery to companies if company recovery vehicles are inoperable.

Battalion maintenance handles repair parts supply in the units that have co-located PLL. In the remaining units, each company handles its own repair parts requests, channeling them through the battalion.

Variations from Doctrine

MAINTENANCE TRAINING

Practice

Variations from Doctrine

OPERATOR/CREW TRAINING

PMCS is touched upon only briefly in operator's AIT so the operators know very little about PMCS when they arrive at the unit. All newly assigned vehicle operators go through a two-week driver training course on post which includes some basic instruction on PMCS.

Typically there is no formal program for operator maintenance training. Most of what operators know about PMCS is learned from informal OJT/work experience from tank commanders, platoon sergeants, and unit mechanics. No maintenance training for operators is shown on the units' training schedules.

Every unit should have a formal driver training program (Par 4-2a, FM 29-2).

Maintenance training for operators and crews is combat training and should be shown on the training schedule (Par 4-2a, FM 29-2).

MECHANIC TRAINING

A newly assigned mechanic is usually paired with a more experienced mechanic for training on the job. OJT is not planned or structured and normally consists only of work experience. Often it is not supervised. Many supervisors realize that some sort of formal training program for mechanics should be taking place in the unit, but maintain that available facilities and adequate numbers of trained supervisors to conduct such programs are insufficient.

OJT is a planned and supervised training process (AR 310-25).

Unit training program must be developed and implemented even though constraints exist (Par 10-3, FM 29-2).

MAINTENANCE TRAINING

Practice

Variations from Doctrine

Some units send selected mechanics to on-post technical courses. These courses include a four-week tracked vehicle mechanics course, and a three-week wheeled vehicle mechanics course. Space in these courses is limited, and only about 10% of a unit's mechanics have been to one of these courses.

Notes and Interview Comments

One unit does have a program for training operators to do PMCS. Two wheeled vehicles a day are brought to the battalion maintenance shop where battalion mechanics show the operators how to perform PMCS. It takes six weeks to do the entire fleet. The main problem with this program is the turnover in operators.

Some persons interviewed felt that lack of OJT for mechanics hindered the maintenance effort, because inexperienced mechanics either do not perform repairs properly or cause further damage during the course of a repair.

Many persons interviewed had the opinion that mechanics newly arrived at the unit from AIT are not proficient in the tasks trained at AIT because the institutional training is all self-paced and/or included little or no hands-on experience. Maintenance supervisors would like to get fully trained mechanics from AIT, and not be responsible for training them to journeyman level in the unit.

APPENDIX B

ANNOTATED LISTING OF LOCAL REGULATIONS AND DIRECTIVES

In addition to the Department of the Army publications listed in the introduction of the report, the following local regulations and directives governed maintenance practice in the four battalions studied. Each regulation or directive is listed along with a brief description of its content and summary of its impact on maintenance practice.

Installation and Division Regulation 750-6, Maintenance of Supplies and Equipment.

This regulation establishes specific maintenance objectives each month for particular aspects of equipment, such as electrical systems, air induction systems, or weapons.

Battalion motor officers and maintenance technicians are typically aware of this regulation. However, actions to implement its provisions are not taken in practice. The specific maintenance objective for February, TAMMS, was not reflected on any unit training schedules.

Installation and Division Circulars 20-53, Unit Inspection Standards, TAMMS; 20-52, Standards for Wheeled Vehicles; and 20-49, Standards for Combat Vehicles.

Circular 20-53 establishes unit inspection standards for TAMMS. It is specifically applicable to inspections by the Inspector General, but unit commanders are encouraged to use these standards in their own inspections. The circular lists specific checks for various TAMMS records, including DD Form 314, DA Form 2404, and DA Form 2408-14: Use of Circular 20-53 is left to the TAMMS clerk.

Circulars 20-52, Standards for Wheeled Vehicles, and 20-49, Standards for Combat Vehicles are used by two or four units. The checks from these circulars are overprinted on DA Form 2404's.

Letter, HQ, XX Division, Subject: Scheduled Preventive Maintenance Services, dated 14 January 1981.

This letter from the Assistant Division Commander for Support emphasizes the importance of periodic services. It encourages the battalions to consolidate periodic services and publish them on the training schedule. The letter also requires more frequent services than DA doctrine for M113's—semiannual in this division, but annual by FORSCOM standards.

Units were working to put this letter into practice. However, they felt that it was impossible for battalion maintenance to do all periodic services, due to limitations of time, personnel and facilities.

Letter, HQ, XX Brigade, Subject: Brigade Vehicle Dispatch Procedures, dated 20 July 1979.

This letter establishes responsibilities and procedures for authorizing wheeled vehicles to leave the unit motor pool. It specifies that each battalion have a dispatcher, and a dispatch inspection point.

Centralized dispatch is not required by DA doctrine and personnel to accomplish it are not authorized by TOE. However, all battalions follow these procedures, utilizing personnel taken from elsewhere.

External SOP, XXX Maintenance Battalion.

This directive standardizes procedures for turn-in of equipment to support maintenance by customer units. It covers preparation of the equipment, including specification of items to be removed and items to be left on the equipment at time of turn-in. It specifies that all wheeled vehicles will be brought to the support shop, while major assemblies from tracked vehicles may be inspected in the unit motor pool.

These procedures are being enforced by the shops of the Maintenance Battalion.

Letter, HQ, 2nd Battalion, XX Armor, Subject: Battalion Maintenance Program (SOP).

This 27-page document provides maintenance goals and standard procedures for:

- Wheeled Vehicles
- Motor Stables
- Maintenance Training (to be published)
- Command Inspection
- Periodic Services
- Incentives
- Maintenance Emphasis and Programs

These procedures closely follow DA doctrine. The document also meets an inspection requirement that each unit have an SOP. In practice, more informal procedures are followed.

Annex F (Tank-Automotive Maintenance) to 4th Battalion, XX Armor Garrison SOP.

The cover portion of this 33-page document establishes responsibilities of the commanders and staff officers, and is followed by appendices for:

- Maintenance Organization
- Repair Parts Supply
- DS Maintenance
- Wheel Inspection Program
- Oil Analysis
- Special Purpose Engineer Equipment
- Tools and Test Equipment
- Controlled Exchange
- Vehicle Markings
- Safety
- Reports
- Publications

As with the SOP for the 2nd Bn, XX Armor, the procedures are not always followed in practice.

Company Maintenance SOP, B Company, 4th Battalion, XX Armor.

The document is dated 1 April 1976. It has a cover letter indicating a review and update in December 1980, done in preparation for an inspection. The company SOP has specific directions for personnel in the shop office and covers the

minutiae of maintenance operations not covered in the battalion SOP, such as cleanliness of the motor pool, line-up of vehicles, and sign-out of tools.

There was only one copy of this document in the motor pool, indicating that it was probably not widely disseminated.

Maintenance SOP, 2nd Battalion, XX Infantry.

The automotive maintenance technician of the 1st Battalion, XX Infantry was using this SOP, dated March 1976, as a basis for preparing a new SOP for his battalion. It describes the way he believes maintenance should be done, not the way it is currently done in the battalion.

Maintenance SOP, 1st Battalion, XX Infantry.

This publication describes desired procedures for scheduling maintenance services. Appendix 1, pages 10-12, has a detailed listing of responsibilities for various maintenance personnel. All procedures in the SOP conform to DA doctrine.

A comparison between the SOP and practice was not completed in this battalion.

Activity Planning Calendar, 2nd Battalion, XX Armor, March-August 1981.

The calendar lists major activities scheduled for the battalion during the next six-month period. Examples are periods of tank gunnery and platoon tactical training.

Training Schedules: 2nd Battalion, XX Armor; 4th Battalion, XX Armor; 1st Battalion, XX Infantry; 1st Battalion, XX Infantry.

These training schedules list the training activities for the companies of each battalion during the periods shown. Schedules are for RED, AMBER, and GREEN periods of the training cycle. RED is post support, GREEN is total training, and AMBER is a combination.

The training schedules provide the types of activities that are part of the training routine, training periods, and the time allotted for maintenance in proportion to other activities.

Programs of Instruction: Track Vehicle Mechanic Course, Post Logistics School; Prescribed Load List Course, Post Logistics School; and Power Generator Mechanics Course, Post Logistics School.

These three programs of instruction were the only ones available at the time of the visit to the post Logistics School. They list the course objectives, the tasks/subjects taught, and the number of instructional hours allotted to each task/subject.

These POI's are examples of the type of technical training that can be provided to units at the installation.

APPENDIX C

MAINTENANCE FORMS

Copies of the various DA and local forms employed in operator and organizational maintenance are provided in this appendix. DA forms are presented first, in numerical order, followed by local forms or local modifications of DA forms.

1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29		30		31																																																																																			
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DD FORM 314

1 DEC 53

PREVIOUS EDITIONS OF THIS FORM MAY BE USED

PREVENTIVE MAINTENANCE SCHEDULE AND RECORD

This portion is provided for convenience in typing the lower lines on BOTH SIDES.
To be detached prior to placing in KARDEX or other visible - type file.

For use of this form, see TM 38-750; the proponent agency is the Office of the Deputy Chief of Staff for Logistics.

For use of this form, see TM 38-750; the proponent agency is the Office of the Deputy Chief of Staff for Logistics.

DA FORM 2404
1 JAN 64

MATERIEL READINESS REPORT																				
1. PERIOD OF REPORT			2. TYPE DATA		3. CURRENT STATUS		4. REPORT CONTROL STAND													
FROM: TO:			5. TYPE DATA		6. CURRENT STATUS		7. REPORT CONTROL STAND													
8. FROM (Include ZIP Code)			9. UNIT IDENT CODE		10. YES <input type="checkbox"/> NO <input type="checkbox"/>		11. REPORT CONTROL STAND													
12. NOMENCLATURE			13. EQUIPMENT AVAILABILITY			14. SERVICEABILITY														
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DA FORM 2406 JAN 64

For use of this form, see TM 28-104, the preprint issued in office of the Supply Chief of Staff for Logistics.

U S GOVERNMENT PRINTING OFFICE 1979-180 962/24001

DA FORM 2407
1 OCT 73

EDITION OF 1 JAN 64 WILL BE USED UNTIL EXHAUSTED

PRE COPY

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FAILURE CODE		FAILURE CODE		FAILURE CODE	
CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION
NON AERONAUTICAL EQUIPMENT		NON AERONAUTICAL EQUIPMENT		NON AERONAUTICAL EQUIPMENT	
71	Accident Damage	837	Fracture, Unstable	314	Stem Acceleration
127	Alignment, improper	881	Fracture Object Damage	315	Stem Deceleration
231	Alignment, improper	740	Frequency (radio or microwave)	150	Smoking
791	Battle Damage	170	Fuel Pressure Incorrect	270	Sony Pattern Defective
879	Broken (includes cracked, cut, torn, punctured)	700	Fuel Pump Effect	271	Sparking
920	Burned (includes burned, scorched, scorched, scorched, scorched)	472	Fuel Valve	313	Static Component
923	Chipped (includes chipped, dented, dented, dented, dented)	861	Fuel Valve	325	Starting Stall
182	Clogged (includes clogged, jammed, jammed, jammed, jammed)	214	Cracked	650	Sticky
221	Cracked (includes cracked, cracked, cracked, cracked)	300	Cracked & Irregularly	740	Storage Tank Incorrect
232	Crack (includes cracked)	311	Heat Leaking	660	Stripped
235	Dry	855	Heat Damage	945	Structure Failure
916	Impending or imminent failure indicated by	320	High Voltage Breakdown	923	Subsonic Shock
381	Leaking (includes leaking)	865	High Voltage	519	Surge
735	Leaking (includes leaking)	870	Hot Fluid Damage	649	Swivel Malfunction
520	Lubrication (includes oil, grease, grease, grease)	317	Hot Spot	695	Sync Asymmetry or Incorrect
925	Missing	820	Humming Noise	330	Temperature Incorrect
821	No Defect - Equipment (previously mentioned)	740	Humming	910	Testing (in, out, not, none)
790	No Defect (includes component removed and	916	Impending or imminent failure indicated by	214	Timing (in, out)
791	replaced to facilitate other maintenance, NMO	167	Intermittent, Out Assembly	370	Touch Screen on Control
792	not applicable, part of NMO compliance, removed	703	Improper Amplifier	916	Touch Intermittent, High
801	for scheduled maintenance, removed for time	627	Improper Antenna	917	Touch Intermittent, Low
802	change, removed for troubleshooting	680	Improper Energy Response	971	Transportation Damage
907	No Defect - NMO compliance	230	Improper Fuel	666	Twisted
908	No Defect - NMO previously mentioned with	690	Improper Sensor Output	561	Unable to Adjust Limit
909	not determined	800	Incorrect Gain	670	Unbalanced
910	Open	864	Incorrect Modulation	680	Unstable
911	Overload	160	Incorrect Voltage	692	Vibration Excessive
912	Overload	801	Intermittent	697	Vision Faulty
913	Overload	320	Intermittent Failure	722	Weld Cracked or Broken
914	Overload	370	Jammed	970	Weld Excessively
915	Overload	381	Leaking (includes leaking)		
916	Overload	382	Leaking (includes leaking)	UTILIZATION CODE	
917	Overload	383	Lock On Malfunction	CODE DESCRIPTION	
918	Overload	730	Loss	00	Active Army (except as otherwise noted)
919	Overload	181	Low Compression	1	Active Army
920	Overload	800	Low Oil in Engine	2	Post Supply Activities, Class I installations
921	Overload	862	Low Power (includes)	3	Post Supply Activities, Class II installations
922	Overload	332	Low Power in Engine	4	Operations/Reserves (not DOR)
923	Overload	753	Lubrication Control	5	Repair and Utilities
924	Overload	600	Maintaining Pressure Beyond Limits	6	ARADCOM Units
925	Overload	275	Manufacture Defect	7	Army National Guard, Except Equipment Pools
926	Overload	344	Motor	8	Army National Guard, Equipment Pools
927	Overload	372	Motor on Magnetic Plug	9	Air Force National Guard units
928	Overload	809	Microphone	A	Army Reserve Units, Except Equipment Pools
929	Overload	753	Mixing	B	Army Reserve Units, Equipment Pools
930	Overload	750	Mixing	C	Air Force Reserve
931	Overload	670	Mixing	D	Army ROTC
932	Overload	670	Mixing	E	Air Force ROTC
933	Overload	670	Mixing	F	U.S. CONARC (not TOE units except direct CG CONARC)
934	Overload	670	Mixing	G	Defense Atomic Support Agency
935	Overload	670	Mixing	H	Army Security Agency
936	Overload	670	Mixing	I	Defense Communications Security Agency
937	Overload	670	Mixing	J	U.S. Army Combat Development Command
938	Overload	670	Mixing	K	U.S. Army Test and Evaluation Command
939	Overload	670	Mixing	L	Low level units
940	Overload	670	Mixing	M	Preparation Room
941	Overload	670	Mixing	N	Deep Inspection Equipment
942	Overload	670	Mixing	O	Equipment assigned to service schools and training centers
943	Overload	670	Mixing	P	Military Assistance Program (MAP)
944	Overload	670	Mixing	Q	Overhaul Facility, Military
945	Overload	670	Mixing	R	Overhaul Facility, Commercial
946	Overload	670	Mixing	S	Manufacturing Facility
947	Overload	670	Mixing	T	Repair Cycle (not DOR)
948	Overload	670	Mixing	V	U.S. Army Intelligence Command
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NMP CO

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CONTINUE ON REVERSE

EDITION OF 1 DEC 77 WILL BE USED.

DA FORM 2408-4
1 JAN 79

DISPOSITION FORM

(AR 340-15)

REFERENCE OR OFFICE SYMBOL	SUBJECT
WASPAA	MONTHLY MILEAGE AND FUEL REPORT

TO	COMMANDER	FROM	COMMANDER	DATE	CITY
	3rd Brigade				
	ATTN: Bgs S-4				

<u>END ITEM</u>	<u>QTY.</u>	<u>MILES</u>	<u>FUEL (GALLONS)</u>
M60A1	<u>17</u>	<u>170</u>	_____
M106A1	_____	_____	_____
M578	_____	_____	_____
M8A1	_____	_____	_____
M113A1	_____	_____	_____
M577A1	_____	_____	_____
M51A1	_____	_____	_____
M51A2	_____	_____	_____
M561	_____	_____	_____
M35A2	_____	_____	_____
M54A2	_____	_____	_____
M520	_____	_____	_____
M599	_____	_____	_____
M553	_____	_____	_____
M813	_____	_____	_____

PREVIOUS EDITIONS WILL BE USED

DA FORM 278-1, APR 68
BALTIMORE BUSINESS FORMS, INC. DANC21-78-C-8807
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PRESS HARD TO ASSURE LEGIBILITY ON ALL COPIES
PREVIOUS EDITION WILL BE USED

REQUEST FOR ISSUE OR TURN-IN (AR 710-2)

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1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236
1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	

OIL ANALYSIS LOG

COMPONENT	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL
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END ITEM:

NOMENCLATURE:

MAKE OR TYPE:

SERIAL NUMBER: _____

SERIAL NUMBER:

TIME SINCE NEW

OR OVERHAUL:

FREQUENCY

OR OVERHAUL:

[illegible]

EQUIPMENT INSPECTION AND MAINTENANCE WORKSHEET									
For use of this form, see TM 38-750; the proponent agency is the Office of the Deputy Chief of Staff for Logistics.									
1. ORGANIZATION					2. NOMENCLATURE AND MODEL				
					M60A1 C1-4				
3. REGISTRATION/SERIAL/FBN		4. MILES	5. HOURS	6. ROUNDS FIRED	7. HOT STARTS	8. DATE	9. TYPE INSPECTION		
7. APPLICABLE REFERENCE									
TM NUMBER			TM DATE		TM NUMBER			TM DATE	
Reg 20-49			15 Apr 80						
INSTRUCTIONS - Perform each check listed in the TM applicable to the inspection performed. Following the sequence listed in pertinent TM, complete form as follows:									
COLUMN a - Enter TM item number.					COLUMN d - Show corrective action for deficiency or shortcoming listed in Column c.				
COLUMN b - Enter the applicable condition status symbol.					COLUMN e - Individual ascertaining completed corrective action initial in this column.				
COLUMN c - Enter deficiencies and shortcomings.									
ALL INSPECTIONS AND EQUIPMENT CONDITIONS RECORDED ON THIS FORM HAVE BEEN DETERMINED IN ACCORDANCE WITH DIAGNOSTIC PROCEDURES AND STANDARDS IN THE TM CITED HEREON.									
9a. SIGNATURE (Person(s) performing inspection)				9b. TIME		9c. SIGNATURE (Maintenance Supervisor)		9d. TIME	
10. MANHOURS REQUIRED									
TM ITEM NO.	STATUS	DEFICIENCIES AND SHORTCOMINGS			CORRECTIVE ACTION			INITIAL WHEN CORRECTED	
a	b	c			d			e	
		ENGINE							
1		Oil level below add or over full on dipstick							
2		Runs with distinct unusual noise							
3		Loose/bare wires causing arcing							
4		Exceeds max RPM (No load 2640 RPM)							
5		Turbocharger INOP							
6		Missing or broken lacing wire							
7		Contaminated oil							
8		Missing filler caps							
9		Any exhaust leaks							
10		Pack removed, INOP, or will not start							
		BATTERY							
1		Electrolyte below plates							
2		Cracked & leaking							
3		Loose connector							
4		Hold down bolt missing							
5		One or more batt missing, unserv., or will not crank engine							
6		Specific gravity below minimum operating level							
7		Shorted/faulty cable/wire							
8		Reverse polarity							

DA FORM 2404
1 JAN 80

Following

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PAGE 5

TM ITEM NO. a	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN CORRECTED e
0		Broken or loose terminals		
		TRANSMISSION/FINAL DRIVE		
1		Inoperable unit must work in all ranges		
2		Defective oil pressure sending unit		
3		Unservicable master cylinder		
4		Leaking seals		
5		Transmission shift linkage broken or out of adjustment		
6		Oil level below add or over full on dipstick		
7		Final drive fluid level more than one inch below fill or check plug		
8		Mounting bolts or washers missing		
9		Final drive breather clogged or missing		
10		Final drive shaft not laced		
11		Neutral safety switch inoperative		
		COOLING SYSTEM		
1		Oil cooler leaking		
2		Inoperative fan		
3		Damaged fan shrouds affecting cooling		
4		Air deflectors damaged affecting cooling		
5		Fluid leaks		
6		Heat shield missing		
		FUEL SYSTEM		
1		Damaged fuel lines affect- ing flow		
2		Any fuel leak		
3		Fuel shutoff valve INOP (from driver's compartment)		
4		Cap/seal missing		
5		Linkage binding or missing		
		AIR CLEANERS		
1		Air cleaner ducts missing or damaged		

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TM ITEM NO. a	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN CORRECTED e
2		Clamps missing or not sealing		
3		Both air cleaner blower motors on same side INOP		
4		Air filter bag damaged		
5		Filter missing, dirty, or loose		
6		Compartment bent, door gasket broken, torn or missing bolts, loose or missing.		
7		Door missing		
		STARTER SYSTEM		
1		Failure to operate		
2		Defective relay		
3		Generator inop, blower motors inop or screen missing.		
		BRAKES		
1		Inop, to include parking brakes		
2		Leaking brake fluid		
3		Linkage bent or out of adjustment, inop		
4		Will not lock in park position.		
5		Pressure drops. Pedal moves when held.		
		TRACK & SUSPENSION		
1		Broken/missing torsion bar(s)		
2		Inner roadwheel bearing or support roller bearing		
3		Bent or damaged wheels		

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TM ITEM NO. a	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN CORRECTED e
		affecting proper tracking		
4		Track & End connectors exceeding wearout limits		
5		Broken track pins or loose blocks or pads or end connectors		
6		Unser sprockets, broken or bent, bolts loose or missing.		
7		Unser tires on roadwheels		
8		Roadwheel or idler wheel missing		
9		Support Rollers loose, cracked, rough surface.		
10		Grease leaks at hub(s)		
11		Track adjusting link missing.		
12		Roadwheel arm bent, broken or missing.		
13		Lug bolts loose or missing.		
14		Two or more shocks missing, bent or unser.		
15		Wedge bolts missing.		
16		Track adjuster broken or inop.		
17		Elongated roadwheel mount- ing holes.		
18		Wear plate missing.		
19		Dead track shoe, 3 or more dead		

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TM ITEM NO. 3	STATUS 5	DEFICIENCIES AND SHORTCOMINGS 6	CORRECTIVE ACTION 4	INITIAL WHEN CORRECTED 7
		HULL		
1		Hatch securing latch inop		
2		Hatch seals torn, missing		
3		Locks loose, missing		
4		Hull drain plugs missing		
5		Bilge pump inop.		
6		Drain valves inop, broken, missing, handle missing		
7		Fender storage box covers bent, broken handle missing		
		LIGHTS		
1		Broken or bare wire		
2		Inop service drive & tail lights		
		DRIVER'S COMPARTMENT		
1		Driver's hatch inop or missing		
2		Escape hatch inop or missing		
3		M27 Periscope--chipped, cracked, dirty, or inter- nal moisture affecting vision		
4		Door springs unser		
		VISION BLOCKS		
1		Vision blocks damaged or painted over impairing vision		
2		Missing blocks		
3				
		GRILL DOORS		
1		Bolt stripped/missing		
2		Hinge missing/broken		
		TURRET		
		MAIN GUN		
1		Primary/secondary fire control--Either system fires in safe or fails to fire on fire		
2		Bore evac missing or loose		
3		Tube dirty/rusty		
4		Any trigger stuck in closed position		

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TM ITEM NO. a	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN CORRECTED e
5		Four or more ammo racks inop		
6		Four or more ready round rack locks inop		
7		Cannot be horesighted		
8		Cannon--cracks, dents, bulges		
9		Recoil system leaking		
10		Loose, missing or defective parts on breech		
11		Recoil bolts loose, broken or not laced		
12		Elevation cylinder inop		
		RECOIL MECHANISM		
1		Leak in replenisher, hydraulic lines or fittings		
2		Loose or broken indicator tape		
3		Improper oil level		
		BREECH MECHANISM		
1		Fails to operate--will not open or close		
2		Rounds fail to extract		
3		Keys missing or broken		
		TURRET MOTOR		
1		Inoperative		
2		Loose/defective parts that prevent traverse, elevation or depression		
3		Turret traversing mech inop either power or manual		
4		Turret elevating mech fails to operate in either power or manual modes		
5		Turret power control-- defective (run-away turret)		
6		Turret creeps		
7		Excessive backlash		
8		Turret drifts		

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7M ITEM NO. 3	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN CORRECTED e
		OTT LEAKS		
1		Traverse mechanism		
2		Gunners control		
		INSTRUMENTS		
1		Not calibrated		
2		Mounts--broken or missing or two or more mounting bolts missing		
3		Range finder--loose, does not function or end hous- ing improperly torqued		
4		Range finder--two or more bolts missing		
5		End housing reflector broken or damaged		
6		Any switch or knob provides improper response		
7		Opticals--chipped or broken on eye contact side		
		M-32 PERISCOPES		
1		Misaligned		
2		Obstructed viewing		
3		Rinds		
4		Broken/missing components		
5		No reticle present		
6		No illumination		
		CAR'S CONTROL HANDLE		
1		Inop		
2		No power		
3		Triggers inop		
		GUNNER'S CONTROLS, BOX AND HANDLES, MISC.		
1		Inop		
2		Light burned out		
3		No power		
4		Switches broken		
5		Wires broken or detached		
6		IR High Voltage Cable frayed or broken		
7		Ballistic Drive--binding or does not operate		

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STOCK NO. _____ NOUN _____

TM _____ DATE _____

FIG _____ ITEM _____ PAGE _____ VEHICLE _____

DESCRIBE FAULT _____

ORDERED BY _____ PRIORITY _____

STOCK NO. _____ NOUN _____

TM _____ DATE _____

FIG _____ ITEM _____ PAGE _____ VEHICLE _____

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STOCK NO. _____ NOUN _____

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FIG _____ ITEM _____ PAGE _____ VEHICLE _____

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FIG _____ ITEM _____ PAGE _____ VEHICLE _____

DESCRIBE FAULT _____

ORDERED BY _____ PRIORITY _____

STOCK NO. _____ NOUN _____

TM _____ DATE _____

FIG _____ ITEM _____ PAGE _____ VEHICLE _____

DESCRIBE FAULT _____

ORDERED BY _____ PRIORITY _____

AOAP MONTHLY REPORT

_____ Co,

Date _____

SECTION I (REGULAR SAMPLES)

1. TOTAL NUMBER OF OIL SAMPLES REQUIRED _____
2. TOTAL NUMBER OF SAMPLES SUBMITTED TO AOAP LAB _____
3. TOTAL NUMBER OF SAMPLES NOT SUBMITTED AND REASON _____

<u>UNIT</u>	<u>END ITEM</u>	<u>COMPONENT</u>	<u>REASON/JOB ORDER</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

ATTACH ADDITIONAL SHEET AS REQUIRED

4. PERCENTAGE OF AOAP UNIT PARTICIPATION _____

SECTION II (SPECIALS)

1. TOTAL NUMBER OF AOAP DIRECTED RESAMPLE REQUESTS _____
2. TOTAL NUMBER OF RESAMPLES SUBMITTED _____
 - a. NUMBER OF AOAP LAB REQUESTED FILTER AND OIL CHANGE _____
 - b. NUMBER OF AOAP LAB REQUESTS PLACING VEHICLE IN "SUGGESTED NON-OPERATIONAL STATUS" PENDING RE-SAMPLE RESULTS _____
 - c. NUMBER OF AOAP LAB CONFIRMED COMPONENT REMOVALS _____

<u>UNIT</u>	<u>END ITEM</u>	<u>COMPONENT</u>	<u>DATE DEADLINED</u>	<u>JOB ORDER</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

3. PERCENTAGE OF AOAP LAB RE-SAMPLE REQUEST COMPLIANCE _____

PARTS REQUEST FORM

PARTS REQUEST FORM

[illegible]

MOTOR SGT. SIGN.